

# Poster Session

## A Soil/Crop Management Example Cross-Disciplinary Student-directed Research As an Innovation in Experiential Learning

Janice Fletcher & Laurel Branen  
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Research indicates that people learn and retain knowledge best when they are active learners. An active learner at the university must go beyond thinking of solutions to problems posed by the instructors, to a higher level of thinking which requires the learner to identify and research problems and interpret the results. Experiential learning, combined with research as a focus provides this opportunity.

Professors at the University of Idaho School of Family and Consumer Sciences are using a cross-disciplinary, experiential learning method based on student-directed research studies. In this course, undergraduate students identify problems, design and conduct research, and analyze and disseminate results. Decision making and communication skills are used as students work together to solve problems within the research target. Undergraduate students from all fields of family and consumer science may participate in this cooperative learning experience with a team of faculty from a variety of fields.

Instructional strategies for the class and products developed by the class will be displayed. Results of a questionnaire about the student researchers' perceptions of their learning orientation in this class (Mastery or Performance Orientation, Ames 1990) will be presented.

A handout will accompany the poster describing strategies that work and instructional cautions.

# Oral Presentations

## A Soil/Crop Management Example

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Teaching students to assess the consequences of agricultural production on soil erosion, soil productivity, environmental quality, and sustainability requires integrated problem solving skills. The Soil Conservation and Management course includes prediction of wind and water erosion followed by evaluation of conservation technologies that reduce soil loss. Students assess the erosion potential on a field or farm and develop recommendations for cropping systems, residue management, and conservation structures that reduce erosion rate without reducing profit potential.

Students integrate several computer exercises into their evaluation of conservation technologies on soil loss and farm profitability. Students first use an erosion prediction model to estimate soil loss from fields that vary in slope, slope length, soil type, and climate and rainfall energy. Students estimate the maximum soil erosion potential under a conventional cropping system and determine the crop rotations, surface residue levels, and conservation structures needed to reduce soil erosion rate for each field. Students then use a residue management program to identify tillage sequences required to provide the residue cover needed to attain the tolerable soil loss rate. The final computer exercise evaluates the economic impact of the soil and crop management decisions for each farm. Students develop complete farm budgets that compare costs and returns for conventional and conservation cropping systems. Students then refine their recommendations established in the first two programs based on net farm profit.

Students obtain valuable critical thinking experience with conservation management decisions. After the computer exercises are completed, students present their "simulated" farm management plans to the class. Guided by the instructor, the class evaluates each "recommended" conservation management plan for its affect on soil erosion and profitability.

## Creative Thinking Curriculum

Rick Parker  
College of Southern Idaho

Traditional schooling and the traditional work place produce an individual with mental blocks toward creative thinking. Traditional schooling and the old work place could not use and did not want too much creativity or ingenuity. Now with the emerging high performance work place, schools and colleges cannot be more of the same with the same old rules. It is a new game with new rules requiring new approaches to learning. School and college programs need to teach and reinforce creativity.

To teach creativity requires a creative approach and an understanding of the creative process. Creative instructors and creative students need to play the role of an explorer, (understanding the problem), artist, (devising a plan), judge, (examining the solution obtained) and warrior, (carrying out the plan). During this presentation a competency-based curriculum for teaching creativity will be discussed with suggestions for incorporating the curriculum into other classes.

## The "Systems Approach" to Instruction in Animal and Veterinary Sciences

Duane Sharp  
Animal and Veterinary Sciences  
Cal State Polytechnic Univ.

The Food and Agricultural Systems Task Force (1986) identified a need for curricular reform in higher education for agriculture programs. The "Systems" approach to instruction, which utilizes methodologies for enhancing learning by conceptualizing real situations, has been pro-

posed as a means of addressing competency deficiencies observed in traditional agricultural instruction programs.

In developing a "Capstone Experience" utilizing "Systems" teaching methodologies to address problems faced by professionals in animal agriculture, I am implementing a teaching concept based on the premise that an experiential-based approach to learning complements the "Systems" approach to solving food and agricultural problems. Autonomous learning facilitates the use of assignments based on case-studies, decision problems, current issues, proposed legislation, and recent developments in the industry. Teaching methodologies include the Kolb's learning style, problem solving, brain storming, mind mapping, role playing, knowledge and skills recall, case-studies, oral presentations, hypothetical management decisions, computerized management decisions, and the development of a portfolio and resource file.

The anticipated outcomes include the following: (1) students will identify problem situations, and use problem solving methodologies for improving a situation (2) students will approach real world agricultural situations, and experience events and problems with a sense of wholeness (3) students will use appropriate methods to identify and effect improvements in problems within systems (4) students will utilize experiential and autonomous learning activities linked with their job demands and to their professional activities (5) students will develop initiative and responsibility, understand complex situations, improve problem solving and decision making capabilities, become more effective communicators, and improve thinking and interpretative skills.

The "Systems Approach" to instruction appears to provide an effective mode to prepare students for the transition from academia to the many professional opportunities in animal agriculture. Graduates will be better prepared for employment through the acquisition of competencies which are currently identified as deficiencies in graduates by agricultural industries.

## 101 Criteria Relevant to Thinking and Learning

Mark Headings  
Ohio State University  
Agricultural Technical Institute

There are a number of things both faculty and students can do to effect the thinking-learning process. A list of 101 criteria relevant to thinking and learning was developed. Two survey forms were prepared, one with 51 criteria for faculty to respond to and the other with 50 criteria for students to respond to. A total of 118 students at The Ohio State University Agricultural Technical Institute completed the student survey form, and 19 faculty members in two divisions completed the faculty survey form. Several criteria receiving desirable student response are that they: (1) have a plan or set of goals for themselves, (2) participate in all classes and field trips, and (3) arrive at classes and complete assignments and exercises on time. Several areas for improvement are: (1) schedule adequate study time and

exercise time, (2) eat a proper diet and refrain from use of drugs (including alcohol and tobacco), and (3) review or rewrite class notes before the next class session. Several criteria receiving desirable faculty responses are that they: (1) communicate clearly course expectations and grading criteria, (2) develop comprehensive course syllabi and distribute them the first day of class, and (3) show respect to students, and create a favorable classroom atmosphere. Several potential areas for improvement are: (1) present a brief visual summary of the class agenda at the beginning of class and give a brief verbal summary at the end, (2) depend less heavily on lecture notes while lecturing, and (3) spend less time writing on chalkboard with back to the students. Faculty and students responded more favorably on their respective survey forms than if the forms were reversed. This was illustrated by asking a class of 15 students to respond to the criteria on the faculty form in addition to the student survey form.

## The Classroom of the Future

Dave Makings  
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NSF-SSI

The "classroom of the future" must be drastically different from the typical classroom of today. The changes required are drastic and must begin now. Although these change processes will continue significant progress must be made within the next 3 to 5 years. Three major aspects influencing this educational change are technology, content and pedagogy.

*1. Technology:* Multimedia, interactive laser disks, CD-ROM, telecommunications and other, as yet unknown, technologies will continue to impact education. Although misused, or misapplied at times (rote drill and mindless games) these advances have far reaching potential.

*2. Content:* Immediate access to an exponentially expanding knowledge base made possible through electronic media will continue to have a profound impact on the "what" is taught. This expanding, evolving knowledge base renders the "12 years of fact memorization is sufficient for a lifetime" philosophy of education totally useless. Critical thinking, problem solving, systems analysis, data acquisition and analysis will replace much of the content memorization of today.

*3. Pedagogy:* The greatest changes will be in the pedagogy--the "how" teaching and learning takes place. Cognitive apprenticeships and vertical and lateral integration of curriculum will blur traditional distinctions between disciplines and grade levels. The public perception of school, community and work as segregated units will fade as authentic tasks and performance-based assessment become standard educational activities. Life long learning and the necessity to more effectively utilize the human (teachers) and material (equipment) capital of our education system will result in mixed age classes. The demands of a restricting workplace and the increasing complexity of society will force an emphasis on cooperative learning, team work and communication skills.

Unless you know where to look it may be very difficult to find "The Classroom of the Future."

## **Developing Critical Thinkers in the Classroom and Beyond -- Moving Beyond Final Jeopardy and Trivial Pursuit**

**Foy Mills Jr.**  
Dept of Agriculture & Environment  
Ablene Christian University

**James Leek**  
President Leeks Inc.  
Albany, GA

Richard Beck declares... "Yes, it is the Socrates where the history of critical thinking begins...Socrates changed the way we look at the world through his questions..If we ask the right questions we may just change the world." The problem is, do we or our students ask the right questions to be world changers? Or possibly, are questions asked at all?

Sometimes the closest thing to a query is, "the correct question to the answer is" in Final Jeopardy. More often, the Trivial Pursuit syndrome persists where a specific answer to a question must exist. Consider the way student progress is often evaluated via objective exams (e.g., true-false, multiple choice). Even our subjective exams tend to have predetermined parameters. Therefore, how can we encourage our students and ourselves to think? A suggested method is through the use of case studies.

Case studies are not new. They have been used extensively in respected business, medical and law schools to encourage higher cognitive thinking skills for years. Case studies may take on many forms, yet they will invariably use some variation on the six steps in decision making: a) problem identification, b) determining alternative courses of action, c) analysis of alternatives, d) selection of the best alternative, e) decision implementation and f) evaluation of the decision that has been implemented.

Case studies have been used as the only form of student evaluation in AGRB 382- Agribusiness Management at Abilene Christian University for the last three years. Similar techniques have been used to train and empower personnel at major agribusiness firms. Increased incorporation of the case study, and the associated analytical tools, and cross-linkage with business can greatly facilitate the development of higher level thinking skills in students. These techniques are found to be useful whether in the classroom, the board room or the "trenches."

## **Teaching the Media a Thing or Two**

**Kathle Johnson**  
Public Information Officer  
Idaho Department of Agriculture

Most Americans are influenced by what they read, hear, and see through the media. We can disagree with the methods and position of the media, but we must recognize the media as an educational tool.

The image of "60-minutes" banging on the door frequently sends a shiver of fear through intelligent minds. No matter how well you hide, the banging on the door will not

go away. Neither will the influence of the media. We may as well accept the fact that the media will continue to be a force in education.

Sanctioning the media does not, however, mean giving absolute control. We can easily influence the accuracy and content of materials presented by the media. Influence and control of the media, quite frankly, takes less effort than getting "60-minutes" away from your door. We can accomplish both tasks when we learn how to "Teach the Media a Thing or Two"

## **Swagman--A Computer Game to Teach Saline Soil Management Under Irrigation Agriculture**

**Charles W. Robbins,**  
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Kimberly, ID

Managing salt affected soils subject to shallow water tables involves understanding the interactions between climate, soil, salinity and texture, crop selection, irrigation water management, water table depth and quality, and irrigation water quality. Visualizing all of the interaction among these factors extends beyond the capability of the human mind. A computer program was developed that simulates the interactions between the above factors to show how changing one factor impacts the outcome of other factors at the end of the crop season. The program shows the effects of management on relative crop yield, surface runoff, soil salinity changes, water table depth and salinity changes. A manual is included with the set that explains the principals of salinity management, and a second manual explains how to operate the program. This is an educational tool designed to teach these interactions and is not a management or predictive model. This version was developed according to Australian terminology and conditions. An "Americanized" version is currently being developed.

## **Student Management Teams: Nurturing Quality for the Classroom**

**Susan Price**  
Univ. of Wisconsin-Platteville

Student Management Teams (SMTs) began at UW-Platteville in the Fall of 1990 with a pilot project funded for the Teaching Excellence Center. The project consisted of ten faculty members who each initiated a student management team and met regularly to discuss the progress of their teams.

A student management team consists of 3-4 students in a course from the same classroom. The team meets in a neutral area (neither classroom nor the instructor's office) every week with the instructor joining them every other week. The team decides on a recorder who keeps a log or journal of suggestions and the progress made by the team. Team members must be willing to get input from other class members throughout the semester.

During the initial visit the instructor gives the charge to the team. The charge reads, "Students, in conjunction with their instructor, are responsible for the success of any

course. As student managers, your special responsibility is to monitor this course through your own experience, to receive comments from other students, to work with your instructor on a regular basis, and to make recommendations to the instructor about how this course can be improved." Discussion for the initial visit should be based on the charge and the following suggested questions (A Handbook for Student Management Teams, July 1992):

1. What were your prejudices about this class or this instructor before you took it?
2. What good experiences have you had to date in this class?
3. What has been the most difficult (or exasperating, or frustrating) part of this class to date?

After the discussion has ended, the team is challenged by the instructor to focus their future meetings on topics such as course content, teaching methods and skills, and classroom interaction. Each student is reminded of the necessity to get input from other class members. As the semester progresses, trust is built among team members and between team members and the instructor.

STMs have made a difference in the classroom. However, there are pitfalls that one should avoid with the teams. One major pitfall is the assumption by students that all suggestions will be implemented. Be sure that everyone understands that this may not happen. Other pitfalls to avoid include lack of interest and leadership by the faculty member, poor communication, students feeling pressured to join the team, and one individual dominating the discussions.

Attempts have been made to assess the outcomes of SMTs. Results from a survey showed that: 87 students (97%) and 12 faculty (100%) indicate that the team caused notable class improvements; 78 students (87%) and 12 faculty (100%) indicate improved course quality; and 90 students (100%) and 11 faculty (92%) would participate on a team again.

## **Integrated Aquaculture and Vegetable Hydroponics: A Model for Teaching Critical Thinking**

**Ronald Rosati, Kerry Tudor,  
Kenneth Smiklas, & Jessica Villar**  
Department of Agriculture  
Illinois State University

Aquaculture continues to be the fastest growing agricultural industry as consumers demand low fat, low cholesterol meat products. Production of fish in recirculating systems has been demonstrated to be an ecologically benign, sustainable industry which employs under-utilized resources, generates alternate farm income, and creates markets for midwestern grains. Faculty in the Illinois State University Department of Agriculture have been using the aquaculture program as an avenue for teaching students information development techniques, analytical reasoning and critical thinking skills.

A student designed and conducted a pilot study to determine the commercial potential of an integrated aquaculture/vegetable hydroponics system located at a large agribusi-

ness firm in central Illinois. Waste products from the aquaculture system were used as fertilizer for the plant production facility and the plant production facility was used to lower fish production costs by reducing the need for filtration equipment. The source of heat for both culture environments was waste heat from ethanol production. The student collected data on water quality parameters, fish growth rates and plant growth rates once per week for a one semester trial. The trial was conducted at the agribusiness site located 50 miles from campus. Analysis of the variables measured was conducted on campus under the supervision of technicians and faculty. A small travel and supplies budget was supplied by the agribusiness firm. Three hours of independent study credit was earned by the student. Results showed that fish growth rates and plant growth rates exceeded standard growth rates for these respective products when grown separate in standard culture environments.

The student found the project to be an exceptional experience which allowed her to gain many valuable insights including the need for critical analysis of commonly held hypothesis, the techniques used to develop and generate new information, and the importance of rigorous information analysis.

## **An Adaptive Process Teaching Model of Televised Instruction**

**Thomas Worley & Ken Casavant**  
Dept of Agricultural Economics  
Washington State University

Multi-campus universities are adopting audio-visual communication systems to link distant classrooms, enabling one instructor to deliver a course to students in multiple locations simultaneously. Instructors stationed at branch locations must use these systems in reverse, reaching back to classes largely comprised of students in residence on the main campus. In one such arrangement in the state of Washington, an agricultural economics faculty member, with teaching and extension appointments and an office at a branch location, has taught an introductory agricultural marketing course during three successive years. This article discusses the challenges encountered and adaptations employed by this branch campus instructor in teaching a main campus class.

A dynamic, adaptive process teaching model is employed to conceptualize the evolutionary nature of experimentation, evaluation and adjustment in the course over the three years.

Outcomes and problems encountered during the first year of the teaching experience led to intense planning efforts for each class period in model two. Visual variety was injected into the course by using both prepared videotapes from libraries and by taping on-site interviews with managers of food marketing firms. Teaching model adjustments chosen in response to year two outcomes included substitution of a term project for a term paper and the introduction of group presentations. Student evaluations showed increased satisfaction by the students as a result of these adjustments, with composite ratings that showed substantial

increases for both years two and three.

Negotiation of the long-distance learning curve by the instructor and evaluations by the students indicate success in making improvements to the course. The importance of advanced planning is heightened by the use of cameras and monitors which tend to magnify flaws in handwritten notes. This analysis suggests that teaching and televising are definitely compatible but require continued instructor sensitivity to the long-distance challenges.

## **Newsletters as an Applied Writing Activity in Horticulture Courses**

**Robert W. Boufford**  
**Ohio State University**  
**Agricultural Technical Institute**

Business leaders and industry advisors now stress the importance of the writing and communication skills of our graduates. Technical competence is no longer the only requirement necessary for a student to obtain and succeed in a work position. A graduate should be able to convey expertise in a variety of communication and writing activities. To address the need for writing competence, there has been an effort to expand writing skills into all academic courses. Traditional term papers are not very effective as they have little application to most activities in horticulture business and industry. Horticulture writing assignments should reflect job-related activities. Even the term paper should be more genre-specific, such as a magazine article or extension publication. Newsletters can serve as a genre-specific alternative to the traditional term paper. With the increased availability of low cost computer desktop publishing systems, there has been an increase in newsletter publishing where many small organizations and businesses can now produce a quality newsletter for their members or customers at a fraction of the cost of traditional printing services. Using computer-based systems can enhance a student's skills of not only creating "the message" but also "the medium" which delivers the message. Encouraging students to write their articles with a word processor helps them extend their skills to producing the complete newsletter with the computer. To bring writing into a horticulture class with application to job-related activities, the instructor assigned a newsletter project with the goal to bring more writing into the course. By assigning a newsletter project, writing skills could be increased while at the same time introducing students to a communication activity they may well encounter on their job.

## **Tech Prep and Agricultural Education**

**Clark Richard Harris**  
**State Fair Community College**  
**Sedalla, MO**

Many of the high school students entering post-secondary agriculture programs will be demonstrating the positive effects of Tech Prep. Tech Prep is a national movement in education involving 850 Tech Prep consortiums and well over 5000 school districts in America. Tech Prep is developing higher expectations for secondary students by requir-

ing rigorous academic courses, technologically sound courses and the development of workplace skills.

Tech Prep is drawing from many of the strong aspects of secondary and post-secondary agricultural education such as cooperative learning, teamwork, problem solving, and critical thinking. Tech Prep incorporates these aspects into the whole secondary educational experience. Tech Prep also depends heavily on greater expectations of students in academic areas by frequently teaching course content in a contextual style. Courses such as Applied Communications, Applied Biology/ Chemistry and Applied Mathematics use specific agricultural examples as well as other examples that relate to the world of work. These types of courses are laying the foundation that will increase student's awareness of agriculture and give them the foundation to perform at a higher level in agricultural classes.

The Heart of Missouri Technical Education Consortium includes State Fair Community College and ten area vocational-technical schools that have agricultural education programs. The Consortium is working to develop a smooth transition for secondary students to enter post-secondary agricultural education programs. Students are able to learn more advanced agricultural concepts at the secondary level since they are receiving higher level skills in academic courses. SFCC currently has agreements to articulate college credit from the ten vocational-technical schools and two comprehensive high schools. SFCC also has agreements to articulate college credit to three universities in Missouri.

## **A Tool for Teaching Decision Making Under Risk**

**Kerry Tudor, Patrick O'Rourke**  
**& Ron Rosati**  
**Department of Agriculture**  
**Illinois State University**

One of the most significant and ubiquitous characteristics of farm and agribusiness operations is the need to quantify, analyze and manage (make decisions about) risk and uncertainty. Teaching students models and techniques for understanding, quantifying and analyzing the impact of risk and uncertainty has long been a component of many farm and agribusiness management courses. The increasing use of more powerful microcomputers and spreadsheet software in business and education and the recent introduction of a spreadsheet "add-in" package for the analysis of business impacted by risk and uncertainty make the application of risk analysis techniques more available to business decision makers and students.

This paper discusses the use of @RISK (an add-in software package from Palisade, Inc.) and EXCEL (a spreadsheet program from Microsoft, Inc) in the simulation modeling of intensive commercial aquaculture production as a vehicle for teaching the application of techniques of risk analysis to real world business situations. The teaching objectives met by this creative approach are: (1) to increase the student's understanding of the potential impact of uncertainty on the financial performance of a commercial

aquaculture enterprise, (2) to increase the student's understanding and skill in the application of risk analysis techniques to uncertain business situations and (3) to improve the student's ability and skill in communicating and explaining the impact of uncertainty to others.

The uncertainty of output prices, input costs and production parameters may be recognized and specified as one of more than 25 probability distributions (in @RISK) within the EXCEL model. Results (cells) such as net income, periodic production, net present value or internal rate of return are selected. Then the @RISK supported simulation is run for any number of iterations generating frequency distributions and statistics for the selected cells. High resolution graphics allow the presentation of results in several communication aiding formats, including frequency distributions, histograms, etc.

## Using Multimedia in the Classroom

James A. Wilson  
Agricultural Department  
College of Southern Idaho

The ability to bring sound, animation, text and instant access to images and motion pictures, opens a new world for educators. Students are raised in a world of where MTV and multiple images are broadcast to them at astounding speed. This exciting and creative world can now be part of the classroom.

Using laser discs and the computer, educators can access all modes of knowledge entry into the minds of students. Students see, hear, and visualize the complex information they are learning. This presentation discusses the hardware and software needed to introduce students to the multimedia classroom. Differing types of interactive presentations will also be discussed and demonstrated.

## Determining the Breadth of Leadership and Human Resource Management/Development Offerings in Postsecondary Departments of Agricultural Education

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University of Nebraska-Lincoln

Business, industry and society are telling colleges and universities that there is a grave need for leadership and human resource preparation for today's students to succeed in the work place. As early as 1976, education's mission included the charge for educators "to develop the abilities needed to exercise and follow effective leadership in fulfilling occupational, social and civic responsibilities." This and other directives resulted in some postsecondary agricultural education departments offering leadership and human resource management/development courses to departmental majors, as well as majors within the college and across the campus. Research was conducted to determine the precise breadth and nature of human resource management/development offerings. Fifty-five postsecondary departments across the United States were surveyed by mail with a

100% response rate. Thirty-six departments offer "courses which deal primarily with leadership and human resource management/development." Those courses account for over 50% of the undergraduate student enrollment (or credit hour production) in 10 (27%) of those departments. An analysis of 80 course titles provided by respondents revealed "leadership" was the most frequently used word appearing in 59 (73%) course titles. Eighty percent of the reporting institutions indicated these courses are taught through the use of a combination of lecture, discussion, and case study methods. Ninety-five percent of the institutions offering these types of courses report that they are taught by full-time faculty from the department of agricultural education. Of those departments offering leadership and human resource management/development courses, 97% judged student attitudes toward their courses as either "extremely" or "moderately" positive. When comparing student attitudes toward these courses compared to all other courses offered at their institutions, 84% of respondents indicated student sentiment as either "much more" or "somewhat more" positive. The process to obtain approval to offer human resource management/development courses was described as either "extremely easy" or "very easy" by 53% of the respondents. Data collected in the study strongly indicates that courses of this type offered through departments of agricultural education are extremely well received by students and faculty and to have been established, in general, without significant difficulty or opposition. Enrollments are reported as being almost equally split between stability and growth.

## Student Perceptions of Learning to Think

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Ag Economics and Rural Sociology

The purpose of education is to supply tools and knowledge, and to stimulate thinking. Tools include analytical techniques, communication and people skills.

Instructors attempt to provide an environment that will stimulate students to think constructively. An instructor makes knowledge of the subject available to the student who then analyzes an assigned problem. The student is guided by the instructor, but he or she must solve the problem.

Instructors are required to evaluate the student's learning progress, but how do students perceive their own progress, and what is effective in helping them become proficient in thinking and problem solving? A survey of students in a class was made to learn how they view the learning process. Respondents were juniors and seniors and the University of Idaho and Washington State University.

Students were asked to respond to pairs of learning devices. They could choose which of the pair was most effective or if they were equal. The majority of students favored practices in the classroom that stimulated them to work, solve problems and think about the subject. They favored discussions over lectures, regular written assignments, being called on in class, preferred field trips over films,

frequent quizzes over infrequent exams, small classes over large ones, relevant over irrelevant material, and demanding over lenient instructors.

When responding about their most outstanding course, half of the students indicated that the instructor made it outstanding, 12% said it was the subject, and 38% credited it to the combination of instructor and subject. Other responses relative to learning devices and characteristics of effective instructors were obtained.

## Thinking Critically About Agricultural Issues

Andrew Barkley  
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Kansas State University

The agricultural sector of the United States provides an enormous number of issues that require critical thought and evaluation, such as low farm incomes, soil depletion, free trade agreements, food safety, rural depopulation, water quality, and farm subsidies. Individuals with different backgrounds, experiences, and perspectives often have divergent opinions on these issues. The objective of this paper is to describe how critical evaluation of agricultural issues in the classroom can lead to greater comprehension, refinement of opinions and ideas, and a compassion for lifelong learning.

Class discussions and weekly writing assignments on agricultural issues can be effectively used to increase awareness and knowledge of the many perspectives that exist on agricultural issues. Challenging students to write an essay from a perspective different from their own, reading and evaluating a book that provides an "urban" perspective on agriculture, or interacting with an expert on sustainable agriculture can provide an exhilarating experience for many students. Knowledge concerning opposing sides of an issue provides a solid foundation for the development, reevaluation, and refinement of our own values and beliefs.

The process of critical thinking about agricultural issues challenges students to become actively involved in lifelong learning. The challenge of understanding why individuals and groups have such widely divergent opinions on the same issue can provide a stimulating intellectual environment that is often carried with students into their career and life. Ideas and past experiences with a senior-level discussion course on critical thinking about agricultural issues will be summarized and evaluated.

## Students Behind the Camera: The Camcorder as an Experiential Instructional Tool for the College Classroom

Janice Fletcher & Erik Anderson  
University of Idaho

Instructors in lecture and laboratory classes can use the camcorder to increase student's skills in problem identification, analysis, and synthesis. Opportunities for experiential learning can be strengthened when instructional strategies include giving students experience behind the camera and in editing videotaped footage. Careful attention to selection

of essential features and maintenance of the camera simplifies the use of the camcorder as an instructional tool.

Showing commercially prepared video tapes to support lectures and demonstrations is a common instructional strategy. A less used strategy is for instructors to make their own recordings with a video camera to support teaching. An even less common but highly effective strategy is to place the students behind the camera. Students can have a hand in directing their own learning as they gain strong experience by planning and recording events, as well as in analyzing the results. Video technology offers a range of strategies for educators to create environments that give students one, two, three or more "rewind trials" at experiential learning.

Video equipment is available in several formats and has a wide range of features. To assure success with the medium, instructors should purchase equipment that will match the needs of their teaching strategies. Applying fundamental equipment operation and maintenance techniques helps insure easier and more effective use of the camcorder as an instructional tool.

This presentation will describe the strategies and benefits of using the camcorder as an instructional tool. The focus is on using the camcorder to promote self-directed learning among students who get behind the camera. Activities that will benefit students, along with equipment operation and maintenance techniques, will be discussed.

## How Does Agricultural Business and Industry View a College Education in the 90s?

Victor A. Bekkum  
Iowa State University

A national study conducted by personal interview and written survey provided universities with agricultural business and industry's perceptions of the education needs of graduates in agriculture in the 90s. Summer employment and summer internships were frequently provided to students by agricultural firms. Work experience, farm experience, and co-op programs were identified as experiences that employers feel are most beneficial in contributing to their employees' success in the workplace.

Communications was the most highly rated educational area. Specific communication skills cited were: understanding and following directions, telephone skills, conversation, technical and creative writing. Problem solving and team building skills were viewed to be very important in today's agricultural firms.

## Critical Thinking to Develop Aquaculture of White Sturgeon (*Acipenser Transmontanus*) in Idaho

Terry Patterson  
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College of Southern Idaho

The first successful spawning in captivity of Idaho white sturgeon took place in 1988 at the College of Southern Idaho. A 49.5 kg female sturgeon (08-109) was caught from the Snake River in April 1987. Female (08-109) was trans-

ported to the CSI hatchery for oocyte staging. The periodic oocyte sampling and development over a 14-month period will be discussed. Spawning was accomplished in June 1988 using methods developed at the University of California, Davis. Culture and feeding experimentation were conducted for one year resulting in the release of over 3,000 yearling sturgeon into Idaho rivers, and reservoirs. Best culture practices were developed and shared with all participants of the cooperative.

Since the initial spawning, the cooperative successfully spawned five additional sturgeon. Through practical research, culture skills have been improved and diets and feeding continue to be investigated. The techniques and information have been transferred to Idaho Fish and Game to help with an experimental sturgeon hatchery in northern Idaho.

CSI fish technology students played an active role in the entire process enhancing their education and training skills. Techniques for incubation, hatching and culture, involving the critical thinking process will also be discussed.

## Poetry and Critical Thinking

William Studebaker  
College of Southern Idaho

Oregon poet William Stafford has said that poetry is what happens in the corner of the eye. By implication he is suggesting that when one looks directly, he does not see totally--he misses the odd, the metaphorical, the connections that drive creativity and creative thinking. Poets exercise an oblique critical process that encourages diverse relationships and provocative insights. Albeit, this process still employs the essential phases of rationality: observation, connection, inference, and evaluation. During this session, participants will look closely at several poems, poems that correspond to a variety of agricultural interests, and will be instructed in how and why poetic construction and critical thinking go hand-in-hand. Additional poems will, also, be presented briefly to illustrate selected aspects of the lecture and discussion. The overall goal of the session is to recognize the relationship between creativity and critical thinking, and to demonstrate the significant role poetic perception can play in a thorough decision-making process, and to encourage teachers to use poems as models when cultivating original thought.

## The Washington Tree Fruit Management Program

Mark K. Mullnix  
Tree Fruit Production Program  
Wenatchee Valley College

Paul Tvergyak  
WSU Cooperative Extension  
Wenatchee, WA

To address the acute need of Washington's tree fruit industry for professional horticulturists, the Agriculture Sciences Department at Wenatchee Valley College (Wenatchee, Washington) and the Department of Horticulture and Landscape Architecture at Washington State Uni-

versity (Pullman, Washington) joined forces to develop and implement a unique undergraduate degree program in deciduous tree fruit production. The program began fall 1992. There are now approximately 40 degree-seeking students enrolled in the program.

The primary objective of the program was to address the need of Washington's tree fruit industry for entry level horticulturists who could assume more responsibility earlier in their career. The second objective was to develop a program that was genuinely industry oriented; one that would exist not outside or at the fringe of the industry but as an integral component of the industry. A third objective of the curriculum was to emphasize pome and stone fruit production. A fourth objective was to develop a curriculum that prepared students for graduate study as well as for professions in the industry. The fifth and final objective of the curriculum was to capitalize upon the respective strengths and capabilities of the cooperating institutions and the tree fruit industry. The Washington Tree Fruit Management Program emphasizes six areas. The six areas are: 1) Pomology, 2) Orchard Integrated Pest Management, 3) Orchard recordkeeping, 4) Advanced Agricultural Science Studies, 5) Student Research Project and 6) Industry internships in which students achieve self-developed educational goals.

In conclusion, the Washington Tree Fruit Management Program was developed as a unique and intensive undergraduate pomology program designed to meet the needs of the tree fruit industry for well prepared horticulturists. It is a fully articulated A.A.S./B.S. degree program offered by Wenatchee Valley College and Washington State University which capitalizes upon the strengths of both institutions and the involvement of the tree fruit industry. The curriculum emphasizes the applied components of deciduous tree fruit crop production and advanced plant sciences. Wenatchee Valley College and Washington State University are committed to attracting bright, energetic and innovative students and it is fully anticipated that this dynamic and innovative horticulture program will yield dynamic and innovative horticulturists to lead Washington's tree fruit industry into the future.

## Reaching Higher Cognitive Levels in the Classroom

Susie Whittington & Doug Pals  
University of Idaho

At the end of this NACTA workshop, participants will be able to:

1. Evaluate Bloom's Taxonomy as a means for assessing cognitive level of instruction.
2. Write objectives across the levels of cognition.
3. Brainstorm teaching activities designed to reach higher cognitive levels.
4. Discuss questioning techniques for acquiring higher cognitive levels in the classroom.
5. Assess cognitive level of instruction using videotapes of problem-solving teaching.

An interest approach showing data from studies of cognitive levels of teaching will be used



to acquire interest of participants. Added to this approach will be various lead questions designed to engage participants in thinking about teaching/learning styles and their ramifications for teaching across the levels of cognition.

Participants will discuss the importance of writing objectives that reflect teaching across the levels of cognition. They will be introduced to key words that can be used in writing clear objectives across the levels of cognition.

Time will be built into the presentation to allow the participants time to write and share objectives from their disciplines that reach across the levels of cognition.

Questioning techniques will be discussed as a means for reaching higher cognitive levels in the classroom.

Role modeling handouts and role playing will be used to introduce strategies that reach higher cognitive levels of instruction. Brainstorming will be utilized to allow participation and idea sharing of additional techniques.

The Florida Taxonomy of Cognitive Behavior will be introduced to the participants. Videotapes of problem solving approaches to teaching will be used for participants to assess cognitive levels of instruction using the Florida Taxonomy of Cognitive Behavior as well as problem-solving as an approach to reach higher cognitive levels of instruction.

Discussion of using the Florida Taxonomy of Cognitive Behavior to assess one's own teaching will be used to summarize the one-hour presentation.

## **How the Ancient Maya Indians Tamed the Tropical Rain Forests**

**James C. Woods**  
Herrett Museum  
College of Southern Idaho

The ancient Maya developed an advanced civilization in the jungles of Central America that lasted for nearly 3,000 years. Though their environment was as harsh as any known, they relied on human creativity and ingenuity to develop ways to farm in the middle of swamps, build some of the largest stone structures on earth, build highways, study the stars, and develop very advanced writing and math systems.

This presentation will show how the Maya cut and shaped the stone blocks used in the construction of their buildings using only simple stone tools. A portion of the presentation will reveal how modern archaeologists creatively rediscovered how effective ancient stone tools were at cutting and shaping giant stone building blocks.

## **Pollution Detection of Agricultural Discharges From a Confined Feedlot**

**Salid Dabestani**  
Quality Assurance Laboratory  
Idaho Department of Agriculture

Environmental pollution resulting from agricultural discharges has been a subject of a great deal of controversy and need to become an integral part of agricultural education. These discharges are classified into different types, depending on the concentration of the pollutants.

Discharges of concentrated animal waste from a con-

finned feed lot is characteristically the most polluted compared to field run off from an agricultural watershed and irrigation return flow.

In this study, surface and ground water sampling and analysis is utilized for pollution detection from a confined feed lot.

Volatile organic compounds (VOC'S), nitrate, fecal coliform, fecal streptococci and total coliform were detected and quantified at different sampling points.

A brief discussion of critical factors affecting specific sampling and analysis such as the type of soil, soil permeability, ground water flow, surface ground water zones, pollution selection and appropriate sampling and analysis techniques will be presented.

The results of this study suggest that the pollution migrating from the feed lot is most likely to be a point source pollution. Similar studies can and should be used as case studies to teach agricultural students.

## **A Tool for Teaching Farm Business Management Using Financial Statements**

**Robert Lowder & Calvin Payne**  
College of Southern Idaho

Managing in present day production agriculture requires an understanding of the business's financial position and how capital and daily financial decisions will affect the business in the future. Traditional financial ratio modeling has not significantly aided managers in the decision-making process to reduce business failure or to assist in recognizing the weaknesses of management. The introduction of the Farm Financial Task Force ratios for agriculture has provided the basis for consistency in ratio analysis in the farming business. These sixteen ratios still leave open areas of interpretation as to the proper source of the needed data for their calculation and interpretation. Additional modeling is needed to properly analyze and plan financially.

Using electronic spreadsheets and financial statements to calculate and build the ratio model and additional ratios including the Altman Bankruptcy model, farm businesses can better interpret, understand and project future plans. Learning how the ratios work and which sources of financial information are best enable the student to make better decisions.

## **Using Information Management Software in Landscape Plant Materials Courses**

**Robert W. Boufford**  
Ohio State University  
Agricultural Technical Institute

In landscape horticulture, the ability to access large amounts of landscape plant information is a necessary and basic skill. It is common for the average landscaper to maintain information on several hundred trees and shrubs, several turf grasses, and a large number of herbaceous flowers. As new species and varieties are developed for use in the landscape, the landscaper must add to this increasing pool of information.

To develop a foundation of basic landscape plant knowl-